

# **APPENDIX E**

MTCA Cleanup Criteria Calculations

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

**Evaluator:** 

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

<u>Item</u>	Symbol	Value	Units
1. General information			
Name of Chemical:		Acenaphthy	lene
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	NB <sub>s</sub>		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for $AF$ , $ABS_d$ , $GI$ :	<b></b>		_
2. Toxicological Properties of the Chemical: Chemical-Specific			_
Oral Reference Dose:	RfD <sub>o</sub>	6.00E-02	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters			
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			-
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	$K_{oc}$	4.900E+03	I/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc} \blacktriangle$	6.400E-03	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m3/mol", enter value here:	H		latm.m³/mol
*Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	4.200E+00	mg/l
5. Target Ground Water Cleanup Level	1		•
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	•		
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	9.90E+02	ug/l
not automatically transferred into this worksheet.			
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)		<u> </u>	-
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

Acenaphthylene

1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

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-To calculate a soil concentration based on Method C vapor pathway, check here:	

Basis for Soil Concentration	Conc	Units				
Most stringent soil concentration based on Soil Direct	pased on Soil Direct					
Contact & Ground Water Protection:	2.523E+02 mg/kg					
Natural Background concentration for Soil:	N/A mg/kg					
Practical Quantitation Limit for Soil:	N/A mg/k					
Soil Cleanup Level (not considering vapor pathway): 2.523E+02 mg/k						
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.						
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg				

Warning: Soil Cleanup Level is higher than Soil Saturation

Limit!

4

**C** <sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

 ${\it R}$  is the ratio of the ground water flow velocity to the

Soil Saturation Limit, $C_{sat}$ :	5.353E+01	mg/kg
Retardation Factor, R:	44.8	unitless

Summary by Exposure Pathway							
			Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		Method C Industrial Land Use @ HQ=1.0; RISK =1.0E-5		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	4.800E+03 N/A	N/A N/A	2.100E+05 N/A	N/A N/A	
			<u>Meth</u> @ HQ=1.0; RI	<u>od C</u> ISK =1.0E-5			
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water	·	RISK? @ Exposure Point	N/A_		N/A		
	Target Ground Water	er CUL? ug/l			)E+02		
	Target Soil CUL?	mg/kg		2.523	E+02		
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0E				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			/A	
(for informational		RISK? @ Exposure Point	N/A		N	/A	
purpose only)	Target Air	@ HQ=1.0	N	/A	N	/A	
ppoo oiii,j	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A	
	Target Soil	@ HQ=1.0	N	/A	N	/A	
<u>.</u>	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	Z	Anthracene	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_{s}$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for $AF$ , $ABS_d$ , $GI$ :	_ 	-	- <del></del>
2. Toxicological Properties of the Chemical: Chemical-Specific	_		-
Oral Reference Dose:	$RfD_o$	3.00E-01	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_{l}$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_{i}$		kg-day/mg
3. Exposure Parameters	_		_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	ABS <sub>i</sub>	i	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific	_		_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	2.300E+04	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	2.700E-03	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here: *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	latm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	4.300E-02	]mg/l
5. Target Ground Water Cleanup Level			_
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	C	A 0.077 t 0.4	]//
*Results from the Ground Water Cleanup Level Worksheet are	C <sub>lp</sub>	4.00E+04	ug/l
not automatically transferred into this worksheet.			4
6. Site-Specific Hydrogeological Characteristics	,		-
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\boldsymbol{\varTheta}_{\boldsymbol{W}}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50");	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	·		_
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)	ı		-
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

Anthracene

# 1. Summary of Results

Ø To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here: Ø

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units				
Most stringent soil concentration based on Soil Direct						
Contact & Ground Water Protection:	4.726E+04	mg/kg				
Natural Background concentration for Soil:	und concentration for Soil: N/A mg/kg					
Practical Quantitation Limit for Soil:	Quantitation Limit for Soil: N/A m					
Soil Cleanup Level (not considering vapor pathway):	4.726E+04	mg/kg				
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.						
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg				

Warning: Soil Cleanup Level is higher than Soil Saturation Limitl

C<sub>set</sub> corresponds to the total soil chemical concentration saturated in soil.

R is the ratio of the ground water flow velocity to the

Soil Saturation Limit, C <sub>sat</sub> :	2.540E+00	mg/kg	
Retardation Factor, R:	206.4	unitless	

	Summar	y by Exposure Path	way				
			Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-:		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	2.400E+04 N/A	N/A N/A	1.050E+06 N/A	N/A N/A	
		10		od B	<u>Meth</u> @ HQ=1.0; R	od C	
Protection of	Under the Current	Predicted Ground Water Conc? ug/l		N	N/A		
Potable Ground Water	Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A		N/A N/A		
Ground Water	Target Ground Wate	er CUL? ug/l	4.000E+04 4.726E+04				
	Target Doll COD:	mgng	<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK=1.0E-6 @ HQ=1.0; RISK=1.0E-				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point				,	
Air Quality	Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A		<del> </del>	/A //A	
(for informational purpose only)	Target Air	@ HQ=1.0	N	I/A	N	/A	
	CUL? ug/m³ Target Soil	@ RISK=1.0E-6 or 1.0E-5 @ HQ=1.0	<del> </del>	I/A I/A	<del> </del>	/A //A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	I/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:		Benzo(a)antl	racene
Measured Soil Concentration, if any:	$C_s$	L	mg/kg
Natural Background Concentration for Soil:	$NB_{s}$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	<b>4</b>		
2. Toxicological Properties of the Chemical: Chemical-Specific		,	_
Oral Reference Dose:	$RfD_{o}$		mg/kg-day
Oral Carcinogenic Potency Factor:	$CPF_{\sigma}$	7.30E+00	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF i		kg-day/mg
3. Exposure Parameters			<b>-</b>
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	3.600E+05	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	1.400E-04	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here:  *Converted unitless form of $H_{cc}$ @13" C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	Н Н <sub>сс</sub>	0.000E+00	_atm.m³/mol _unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	9.400E-03	mg/l·
5. Target Ground Water Cleanup Level	,	,	-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:  *Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	1.80E-02	ug/l
not automatically transferred into this worksheet.	"		
6. Site-Specific Hydrogeological Characteristics			_
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{\scriptscriptstyle{W}}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms		\	_
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			<del>-</del>
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

Benzo(a)anthracene

### 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		•
Contact & Ground Water Protection:	3.318E-01	mg/kg
Natural Background concentration for Soil:	N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering vapor pathway):	3.318E-01	mg/kg
Warning! Soil Cleanup Level above may not be pr pathway - evaluate vapor pathwa	-	oor exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

R is the ratio of the ground water flow velocity to the

1

Soil Saturation Limit, $C_{sat}$ :	8.665E+00	mg/kg
Retardation Factor, R:	3,215.9	unitless

Summary of Calcu		y by Exposure Path				<del></del>	
	Summar	y by Exposure 1 ath	Meth Unrestricte	o <u>d B</u> d Land Use RISK =1.0E-6	<u>Meth</u> Industrial @ HQ=1.0; R	Land Use	
Soil Direct			Ingestion only	Ingestion &	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	N/A 1.370E-01	N/A N/A	N/A 1.798E+01	N/A N/A	
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1			od C	
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable Ground Water	Condition	HQ? @ Exposure Point RISK? @ Exposure Point	<del></del>	N/A N/A		N/A N/A	
Ground Water	Target Ground Wat	er CUL? ug/l	1.800E-02			·	
	Target Soil CUL?	mg/kg	3.318E-01  Method B  Method C  Method C  Method C  Method C  Method C				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point RISK? @ Exposure Point				//A //A	
(for informational purpose only)	Target Air CUL? ug/m³	@ HQ=1.0 @ RISK=1.0E-6 or 1.0E-5	N	I/A	N	I/A I/A	
	Target Soil	@ HQ=1.0	N	I/A	N	I/A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	1/A	N	I/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

#### Worksheet for Calculating Soil Cleanup Levels for Unrestricted & Industrial Land Use

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:		Benzo(b)fluo	ranthene
Measured Soil Concentration, if any:	$C_{\mathfrak{s}}$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS, GI:	_ 	•	
2. Toxicological Properties of the Chemical: Chemical-Specific			
Oral Reference Dose:	RfD <sub>o</sub>		mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	7.30E+00	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_i$		kg-day/mg
3. Exposure Parameters			-
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			<b>-</b>
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	1.200E+06	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	H <sub>cc</sub> ♠	4.600E-03	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here: $*Converted$ unitless form of $H_{cc}$ @13°C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	1.500E-03	mg/l
5. Target Ground Water Cleanup Level			
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	_		]
*Results from the Ground Water Cleanup Level Worksheet are	$C_{\nu}$	1.80E-02	ug/l
not automatically transferred into this worksheet.			_
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	11	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms		•	-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

Benzo(b)fluoranthene

# 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		
Contact & Ground Water Protection:	1.106E+00	mg/kg
Natural Background concentration for Soil:	N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering yapor pathway):	1.106E+00	mg/kg
Warning! Soil Cleanup Level above may not be propathway - evaluate vapor pathwa		or exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

R is the ratio of the ground water flow velocity to the

Soil Saturation Limit, C <sub>sat</sub> :	4.608E+00	mg/kg
Retardation Factor, R:	10,717.3	unitless

Summary by Exposure Pathway						
				od <u>B</u> d Land Use RISK =1.0E-6	<u>Meth</u> Industrial @ HQ=1.0; R	Land Use
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	N/A 1.370E-01	N/A N/A	N/A 1.798E+01	N/A N/A
		TOTAL HOLD ON HOLD	<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0			od C
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A			
Potable	Condition	HQ? @ Exposure Point		/A	N/A	
Ground Water	Target Ground Wate	RISK? @ Exposure Point	N/A N/A N/A 1.800E-02			/A
	Target Soil CUL?				E+00	
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0			
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A			
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			
(for informational	T	RISK? @ Exposure Point	<del> </del>	/A	-	//A
purpose only)	Target Air CUL? ug/m³	@ HQ=1.0 @ RISK=1.0E-6 or 1.0E-5	<u> </u>	/A /A	<del> </del>	/A //A
	Target Soil	@ HQ=1.0	N/A N/A			
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	I/A

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:		Benzo(k)flu	ranthene
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS, GI:			
2. Toxicological Properties of the Chemical: Chemical-Specific			
Oral Reference Dose:	$RfD_o$		mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	7.30E+00	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters	-		_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH [	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific	_		
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	1.200E+06	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc} \blacktriangle$	3.400E-05	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m3/mol", enter value here:	H	0.000 - 00	atm.m³/mol
*Converted unitless form of $H_{cc}$ @13°C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	H <sub>cc</sub>	0.000E+00	unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	8.000E-04	_lmg/l	
5. Target Ground Water Cleanup Leyel			=	
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	_			
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	1.80E-02	lug/l	
not automatically transferred into this worksheet.				
6. Site-Specific Hydrogeological Characteristics	į			
Total Soil Porosity (default = "0.43"):	It	0.43	unitless	
Volumetric Water Content (default = "0.30"):	$oldsymbol{arTheta}_{1  u}$	0.3	unitless	
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless	
Dry Soil Bulk Density (default = "1.50"):	$ ho_b$	1.5	kg/l	
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless	
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless	
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	,		_	
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the				
air concentration at the exposure point (e.g., within the building)	,		<del>-</del> 1	
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless	

Chemical of Concern: Benz

Benzo(k)fluoranthene

# 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

-To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		
Contact & Ground Water Protection:	1.106E+00	mg/kg
Natural Background concentration for Soil:	. N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering vapor pathway):	1.106E+00	mg/kg
Warning! Soil Cleanup Level above may not be properly pathway - evaluate vapor pathway	•	or exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

**C**<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

R is the ratio of the ground water flow velocity to the

Soil Saturation Limit, $C_{sat}$ :	2.458E+00	mg/kg
Retardation Factor, R:	10,717.3	unitless

Summary by Exposure Pathway							
			Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		Method C Industrial Land Use  @ HQ=1.0; RISK =1.0E-5		
Soil Direct	·		Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	n/a n/a	N/A N/A	N/A N/A	
	Target Soil CUL? ing/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	N/A 1.370E-01	N/A N/A	N/A 1.798E+01	N/A N/A	
			<u>Method B</u> <u>Method ©</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK				
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable Ground Water	Condition	HQ? @ Exposure Point RISK? @ Exposure Point	<del> </del>	/A /A	<del></del>	/A /A	
Givunu water	Target Ground Wate	er CUL? ug/l		1.800	DE-02		
	Target 3011 COL	ing/kg	1.106E+00  Method B  @ HQ=1.0; RISK =1.0E-6  @ HQ=1.0; RISK =1.0				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A			/A	
(for informational	Target Air	RISK? @ Exposure Point @ HQ=1.0	<del> </del>	/A		/A /A	
purpose only)	CUL? ug/m <sup>3</sup>	@ RISK=1.0E-6 or 1.0E-5		/A	N	/A	
	Target Soil	@ HQ=1.0	<del> </del>	I/A	<del> </del>	/A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A	

**CAUTION**: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	I	Bis(2-ethylhe	xyl)phthalat
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	<b>√</b>		_
2. Toxicological Properties of the Chemical: Chemical-Specific			_
Oral Reference Dose:	$RfD_{\sigma}$	2.00E-02	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	1.40E-02	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>	·····	kg-day/mg
3. Exposure Parameters	_		_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_{i}$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	ABI	11	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			<del>-</del> 1
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	1.100E+05	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	4.200E-06	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here:  *Converted unitless form of H., @13°C: (Enter this converted value into "H., input Box" above for a calculation)	H	0.000E+00	atm.m³/mol unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway  4. Physical and Chemical Properties of the Chemical: Chemical-Specific  Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value  Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	GI K <sub>oc</sub> H <sub>cc</sub>	4.200E-06	unitless  l/kg unitless atm.m³/me

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	3.400E-01	_mg/i
5. Target Ground Water Cleanup Level			_
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	C	2 2012 : 00	/1
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	2.20E+00	ug/l
not automatically transferred into this worksheet.			١
6. Site-Specific Hydrogeological Characteristics			_
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$oldsymbol{arTheta}_{ u}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$ ho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern: Bis(2-ethylhexyl)phthalate

# 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units			
Most stringent soil concentration based on Soil Direct					
Contact & Ground Water Protection:	1.240E+01	mg/kg			
Natural Background concentration for Soil:	N/A	mg/kg			
Practical Quantitation Limit for Soil:	untitation Limit for Soil: N/A				
Soil Cleanup Level (not considering vapor pathway):	1.240E+01	mg/kg			
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg			

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

 ${\it R}$  is the ratio of the ground water flow velocity to the

Soil Saturation Limit, C <sub>sat</sub> :	9.581E+01	mg/kg
Retardation Factor, R:	983.3	unitless

	Summary by Exposure Pathway							
			<u>Method B</u> Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5			
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal		
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A		
	Target Soil	@HQ=1.0	1.600E+03	N/A	7.000E+04	N/A		
	CUL? ing/kg	@RISK =1.0E-6 or 1.0E-5	7.143E+01	N/A	9.375E+03	N/A		
			<u>Meth</u> @ HQ=1.0; R	<u>Meth</u> @ HQ=1.0; R	od <u>C</u> .ISK =1.0E-5			
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A					
Potable	Condition	HQ? @ Exposure Point	N/A		N/A			
Ground Water		RISK? @ Exposure Point	N	/A	N/A			
	Target Ground Wate	er CUL? ug/l		2.200	E+00			
	Target Soil CUL?	mg/kg	1.240E+01					
			<u>Meth</u>	10d B	Metl	iod C		
			@ HQ=1.0; R	ISK =1.0E-6	@ HQ=1.0; F	USK =1.0E-5		
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A					
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			/A		
(for informational		RISK? @ Exposure Point	N	/A	N	/A		
purpose only)	Target Air	@ HQ=1.0	N	/A	N	//A		
purpose only)	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	//A		
	Target Soil	@ HQ=1.0	N	I/A	J	I/A		
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	I/A		

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	<u>Value</u>	Units
1. General information			
Name of Chemical:		Butyl benzy	phthalate
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	V		
2. Toxicological Properties of the Chemical: Chemical-Specific	_		••••
Oral Reference Dose:	$RfD_o$	2.00E-01	ing/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	RfD <sub>1</sub>	2.00E-01	mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>l</sub>		kg-day/mg
3. Exposure Parameters		r	=
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	11	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	1.400E+04	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	H <sub>cc</sub> ♠	5.200E-05	<del>-</del> 1 .
*If the value for Henry's Law Constant is given in the unit of "atm.m3/mol", enter value here:	Н		atın.m³/mol
*Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	H <sub>cc</sub>	0.000E+00	unitless –

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	2.700E+00	mg/l
5. Target Ground Water Cleanup Level	'		-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:		,	1
*Results from the Ground Water Cleanup Level Worksheet are	$C_{1\nu}$	1.90E+03	ug/l
not automatically transferred into this worksheet.			]
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\boldsymbol{\Theta}_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	'		-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

Butyl benzyl phthalate

### 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units	
Most stringent soil concentration based on Soil Direct			V
Contact & Ground Water Protection:	1.370E+03	mg/kg	L
Natural Background concentration for Soil:	N/A	mg/kg	
Practical Quantitation Limit for Soil:	or Soil: N/A		
Soil Cleanup Level (not considering vapor pathway):	1.370E+03	mg/kg	
Warning! Soil Cleanup Level above may not be pr pathway - evaluate vapor pathwa	•	or exposure	
Soil concentration based on Vapor Pathway (informational purposes only):	or Pathway 0.000E+00 mg/		(

Warning: Soil Cleanup Level is higher than Soil Saturation Limit!

**C**<sub>set</sub> corresponds to the total soil chemical concentration saturated in soil.

 $\boldsymbol{R}$  is the ratio of the ground water flow velocity to the

Soil Saturation Limit, C <sub>sat</sub> :	9.731E+01	mg/kg
Retardation Factor, R:	126.0	unitless

Summary by Exposure Pathway							
			Unrestricte	od <u>B</u> d Land Use RISK =1.0E-6	1		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	1.600E+04 N/A	N/A N/A	7.000E+05 N/A	N/A N/A	
		Total Indian	<u>Meth</u> @ HQ=1.0; R	od B	<u>Method C</u> @ HQ=1.0; RISK =1.0E-5		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable	Condition	HQ? @ Exposure Point	N	/A	N	/A	
Ground Water		RISK? @ Exposure Point	N/A		N/A		
÷ .	Target Ground Water Target Soil CUL?	1.900E+03 1.370E+03					
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0E				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			/A	
(for informational		RISK? @ Exposure Point	N	/A	N	/A	
purpose only)	Target Air	@ HQ=1.0	3.200E+02		7.00	)E+02	
1 1	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A	
	Target Soil	@ HQ=1.0	0.000	E+00	0.00	)E+00	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	//A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	[	Chrysene	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for $AF$ , $ABS_d$ , $GI$ :	Ū.		
2. Toxicological Properties of the Chemical: Chemical-Specific	_		-4 ·
Oral Reference Dose:	$RfD_o$		mg/kg-day
Oral Carcinogenic Potency Factor:	CPF o	7.30E+00	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters	<u>.</u>		<b>-</b> -
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_{i}$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical; Chemical-Specific	-		
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	4.000E+05	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc} \blacktriangle$	3.900E-03	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here:  *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	latm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	1.600E-03	mg/I
5. Target Ground Water Cleanup Level		3 <del></del>	-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	C	1 COT: 02	/1
*Results from the Ground Water Cleanup Level Worksheet are not automatically transferred into this worksheet.	$C_{1\nu}$	1.80E-02	ug/l
6. Site-Specific Hydrogeological Characteristics	· i		
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\boldsymbol{\Theta}_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	•		-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

Chrysene

# 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units			
Most stringent soil concentration based on Soil Direct					
Contact & Ground Water Protection:	3.687E-01	mg/kg			
Natural Background concentration for Soil:	N/A	mg/kg			
Practical Quantitation Limit for Soil:	al Quantitation Limit for Soil: N/A m				
Soil Cleanup Level (not considering vapor pathway):	3.687E-01	mg/kg			
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg			

**C**<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

 ${\it R}$  is the ratio of the ground water flow velocity to the

Soil Saturation Limit, $C_{sat}$ :	1.639E+00	mg/kg
Retardation Factor, R:	3,573.1	unitless

Summary by Exposure Pathway							
			Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6				
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil	@HQ=1.0	N/A	N/A	N/A	N/A N/A	
	CUL? mg/kg	@RISK =1.0E-6 or 1.0E-5	5   1.370E-01   N/A   1.798E+01   N <u>Method B</u>   <u>Method C</u> @ HQ=1.0; RISK =1.0E-6   @ HQ=1.0; RISK =1				
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water	Target Ground Wat	RISK? @ Exposure Point	Point N/A 1.800E-02			N/A	
	Target Soil CUL?		3.687				
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point				N/A	
(for informational	T 44'	RISK? @ Exposure Point			<del> </del>	/A	
purpose only)	Target Air CUL? ug/m³	@ HQ=1.0 @ RISK=1.0E-6 or 1.0E-5		/A  /A	<del> </del>	/A /A	
	Target Soil	@ HQ=1.0	<del> </del>	/A /A	<del> </del>	/A /A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5		/A		//A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i);
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

**Evaluator:** 

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	[]	Dibenzo(a,h	anthracene
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	V		
2. Toxicological Properties of the Chemical: Chemical-Specific	_		<del></del> 4
Oral Reference Dose:	RfD <sub>o</sub>		mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	7.30E+00	kg-day/nig
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters	,		<del>-</del>
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_{l}$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	. K <sub>oc</sub>	1.800E+00	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	H <sub>cc</sub> ♠	6.000E-07	
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here: *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	2.500E-03	mg/l
5. Target Ground Water Cleanup Level			
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	<i>a</i>		] _
*Results from the Ground Water Cleanup Level Worksheet are	$C_{v}$	1.80E-02	lug/l
not automatically transferred into this worksheet.			_
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{\it oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)		F	_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

Dibenzo(a,h)anthracene

# 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration Conc		Units		
Most stringent soil concentration based on Soil Direct				
Contact & Ground Water Protection:	1.659E+00	mg/kg		
Natural Background concentration for Soil:	N/A	mg/kg		
Practical Quantitation Limit for Soil:	al Quantitation Limit for Soil: N/A n			
Soil Cleanup Level (not considering vapor pathway):	1.659E+00	mg/kg		
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.				
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg		

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

 ${\it R}$  is the ratio of the ground water flow velocity to the

Soil Saturation Limit, $C_{sat}$ :	1.152E+01	mg/kg
Retardation Factor, R:	16,075.4	unitless

Summary by Exposure Pathway							
				Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5	
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	N/A 1.370E-01	N/A N/A	N/A 1.798E+01	N/A N/A	
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =				
Protection of	Under the Current	Predicted Ground Water Conc? ug/l					
Potable	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water	Target Ground Wate	RISK? @ Exposure Point	N/A N/A 1.800E-02			/A	
	Target Soil CUL?		1.659E+00				
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			//A	
(for informational		RISK? @ Exposure Point	N/A		N/A		
purpose only)	Target Air	@ HQ=1.0	N/A		N/A		
	CUL? ug/m <sup>3</sup>	@ RISK=1.0E-6 or 1.0E-5	-5 N/A			I/A	
	Target Soil	@ HQ=1.0	N	//A		I/A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	I/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

## A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	Ċ	li-butylphth	alate
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	<b></b> ✓		
2. Toxicological Properties of the Chemical: Chemical-Specific			_
Oral Reference Dose:	$RfD_o$	1.00E-01	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		ing/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_i$		kg-day/mg
3. Exposure Parameters	_		
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific	_		_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	1.600E+03	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	3.900E-08	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here:	$H \mid \mid$		atın.ın³/ınol
*Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	1.100E+01	]mg/l
5. Target Ground Water Cleanup Level			- -
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	_		
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	4.50E+03	ug/l
not automatically transferred into this worksheet.			_
6. Site-Specific Hydrogeological Characteristics			_
Total Soil Porosity (default = "0.43"):	11	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{y}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$ ho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	·		
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)	ı		-
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

di-butylphthalate

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here: 1 V

To calculate a soil concentration based on Method C vapor pathway, check here:

	Basis for Soil Concentration	Conc	Units			
٠	Most stringent soil concentration based on Soil Direct					
	Contact & Ground Water Protection:	3.866E+02	mg/kg			
	Natural Background concentration for Soil:	N/A	mg/kg			
	Practical Quantitation Limit for Soil:	N/A	mg/kg			
	Soil Cleanup Level (not considering vapor pathway):	3.866E+02	mg/kg			
	Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
	Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg			

Warning: Soil Cleanup Level is higher than Soil Saturation Limitl

 $\mathbf{C}_{\mathit{sat}}$  corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, $C_{sat}$ :	4.726E+01	mg/kg	1
Retardation Factor, R:	15.3	unitless	

Summary by Exposure Pathway								
		V	Meth Unrestricte @ HQ=1.0;	od <u>C</u> Land Use ISK =1.0E-5				
Soil Direct				Ingestion & Dermal	Ingestion only	Ingestion & Dermal		
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A		
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK:=1.0E-6 or 1.0E-5	8.000E+03 N/A	N/A N/A	3.500E+05 N/A	N/A N/A		
			<u>Meth</u> @ HQ=1.0; R	<i>od <u>B</u></i> ISK =1.0E-6	<u>Method C</u>			
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A					
Potable	Condition	HQ? @ Exposure Point	N/A		N/A			
Ground Water		RISK? @ Exposure Point	N	/A	<u> </u>	/A		
	Target Ground Wate Target Soil CUL?			4.500				
	Tanger over copy	шдид	3.866E+02 <u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0E					
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A					
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A					
(for informational		RISK? @ Exposure Point	t N/A N/A			/A		
purpose only)	Target Air	@ HQ=1.0	N	/A	N	/A		
, p. 133 3.1.7/	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A		
	Target Soil	@ HQ=1.0	N	//A	N	/A		
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	/A		

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	[1	luoranthene	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg .
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	7		
2. Toxicological Properties of the Chemical: Chemical-Specific	<u></u>		_
Oral Reference Dose:	$RfD_o$	4.00E-02	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_i$		kg-day/mg
3. Exposure Parameters	_		
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_{i}$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific	_		
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	4.900E+04	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	6.600E-04	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here: *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	atım.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	2.100E-01	mg/l
5. Target Ground Water Cleanup Level			_
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:			1
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	1.40E+02	ug/l
not automatically transferred into this worksheet.			
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	It	0.43	unitless
Volumetric Water Content (default = "0.30"):	$oldsymbol{arTheta}_{ u}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			•
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF	•	unitless

**Chemical of Concern:** 

fluoranthene

### 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here: 1 V

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		
Contact & Ground Water Protection:	3.518E+02	mg/kg
Natural Background concentration for Soil:	N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering vapor pathway):	3.518E+02	mg/kg
Warning! Soil Cleanup Level above may not be pr pathway - evaluate vapor pathwa	•	or exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

Warning: Soil Cleanup Level is higher than Soil Saturation

Limit

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	2.638E+01	mg/kg
Retardation Factor, R:	438.6	unitless

Summary by Exposure Pathway							
			<u>Metli</u> Unrestricte @ HQ=1.0; l	<u>Meth</u> Industrial @ HQ=1.0; R			
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	3.200E+03 N/A	N/A N/A	1.400E+05 N/A	N/A N/A	
			<u>Meth</u> @ HQ=1.0; R	od <u>B</u> ISK =1.0E-6	Method C		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A :			:	
Potable Cround Water	Condition	HQ? @ Exposure Point	N/A N/A		N/A N/A		
Ground Water	Target Ground Wate	RISK? @ Exposure Point er CUL? ug/l	N.		E+02	/A	
	Target Soil CUL?	mg/kg		3.518	E+02		
			<u>Metl</u> @ HQ=1.0; R	nod <u>B</u> ISK =1.0E-6	<u>Meth</u> @ HQ=1.0; R	<u>od C</u> .ISK =1.0E-5	
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A				
(for informational		RISK? @ Exposure Point	N	/A	N	/A	
purpose only)	Target Air	@ HQ=1.0	N	/A	N	/A	
kk.22.0113)	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	E-5 N/A N/A			/A	
,	Target Soil	@ HQ=1.0	N	//A	N	/A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

**Evaluator:** 

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

<u> Item</u>	Symbol	Value	Units
1. General information			
Name of Chemical:		indeno(1,2,3-	cd)pyrene
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	_ _		_
2. Toxicological Properties of the Chemical: Chemical-Specific			<del>-</del>
Oral Reference Dose:	$RfD_{o}$		mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	7.30E+00	kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters		······································	-1
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	I	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			-
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	3.500E+06	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	6.600E-05	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here: *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	H H <sub>cc</sub>	0.000E+00	_atm.m³/mol _unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	2.200E-05	mg/l
5. Target Ground Water Cleanup Level			
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:  *Results from the Ground Water Cleanup Level Worksheet are not automatically transferred into this worksheet.	$C_{w}$	1.80E-02	ug/l
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$oldsymbol{arTheta}_{ u}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			<del></del>
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

indeno(1,2,3-cd)pyrene

#### 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units			
Most stringent soil concentration based on Soil Direct					
Contact & Ground Water Protection:	3.226E+00	mg/kg			
Natural Background concentration for Soil:	N/A	mg/kg			
Practical Quantitation Limit for Soil:	N/A	mg/kg			
Soil Cleanup Level (not considering vapor pathway):	3.226E+00	mg/kg			
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg			

Warning: Soil Cleanup Level is higher than Soil Saturation Limit!

**C**<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	1.971E-01	mg/kg	R is the ratio of the ground water flow velocity to the
Retardation Factor, R:	31,256.8	unitless	contaminant migration velocity in saturated zone.

. Summary of Calcu	Summary of Calculation for each Exposure Pathway					
	Summar	y by Exposure Path	way			
Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6					<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5	
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A
	Target Soil	@HQ=1.0	N/A	N/A	N/A	N/A N/A
	CUL? mg/kg	@RISK =1.0E-6 or 1.0E-5	Meth	1.370E-01 N/A 1.798E+01 Method B Method B Method B Method B HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A			
Potable Cround Water	Condition	HQ? @ Exposure Point RISK? @ Exposure Point		/A /A	N/A N/A 0E-02	
Ground Water	Target Ground Wat		14			
	Target Soil CUL?	mg/kg		3.226	E+00	
	·		<u>Meth</u> @ HQ=1.0; R	<u>10d B</u> ISK =1.0E-6	<u>Meth</u> @ HQ=1.0; R	<u>iod C</u> JSK =1.0E-5
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A			
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A		/A	
(for informational		RISK? @ Exposure Point	N	/A	N	/A
purpose only)	Target Air	@ HQ=1.0	N	/A	N	/A
ppood viiig)	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	· N	/A	N	/A
	Target Soil	@ HQ=1.0	N	/A	N	//A
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:		pentachlorog	henol
Measured Soil Concentration, if any:	$C_{\mathfrak{s}}$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS <sub>d</sub> , GI:	<b>7</b>		
2. Toxicological Properties of the Chemical: Chemical-Specific			=
Oral Reference Dose:	$RfD_o$	3.00E-02	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>	1.20E-01	kg-day/mg
Inhalation Reference Dose:	RfD <sub>i</sub>		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters			_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH [	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	5.900E+02	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	1.000E-06	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here: *Converted unitless form of $H_{cc}$ @13 °C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	_atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	2.000E+03	mg/l
5. Target Ground Water Cleanup Level			_
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	<i>C</i>	7.90E+00	]//
*Results from the Ground Water Cleanup Level Worksheet are	Ch	/• <b>X</b> U&*UU	ug/l
not automatically transferred into this worksheet.			4
6. Site-Specific Hydrogeological Characteristics			_
Total Soil Porosity (default = "0.43"):	11	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\boldsymbol{\Theta}_{_{\mathbf{1V}}}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			<b>-</b>
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

pentachlorophenol

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

	Basis for Soil Concentration	Conc	Units	
	Most stringent soil concentration based on Soil Direct			
	Contact & Ground Water Protection:	2.702E-01	mg/kg	
	Natural Background concentration for Soil:	N/A	mg/kg	ŀ
	Practical Quantitation Limit for Soil:	N/A	mg/kg	
	Soil Cleanup Level (not considering vapor pathway):	2.702E-01	mg/kg	
	Warning! Soil Cleanup Level above may not be propathway - evaluate vapor pathway	-	or exposure	
╼	Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg	(

**C**<sub>set</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, $C_{sat}$ :	3.421E+03	mg/kg
Retardation Factor, R:	6.3	unitless

Community of Calculation for each Exposure Latinuay						
	Summar	y by Exposure Path	way		Meth	
			<u>Method B</u> Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6			
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal
Contact		HQ? @ Exposure Point	N/A	N/A	N/A	N/A
	Condition	RISK? @ Exposure Point	N/A	N/A	N/A	N/A
	Target Soil	@HQ=1.0	2.400E+03	N/A	1.050E+05	N/A
	CUL? mg/kg	@RISK =1.0E-6 or 1.0E-5	8.333E+00	N/A	1.094E+03	N/A
			<u>Meth</u> @ HQ=1.0; RI	od <u>B</u> ISK =1.0E-6	<u>Method C</u> @ HQ=1.0; RISK =1.0E-5	
Protection of	Under the Current	Predicted Ground Water Conc? ug/l		N	N/A	
Potable	Condition	HQ? @ Exposure Point	N	/A	N	/A
<b>Ground Water</b>		RISK? @ Exposure Point	N	/A	N	/A
	Target Ground Wate	er CUL? ug/l		7.900	E+00	
	Target Soil CUL?	mg/kg		2.702	2E-01	
			Meth	od B	Meth	od C
			@ HQ=1.0; R	ISK =1.0E-6	@ HQ=1.0; R	USK =1.0E-5
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A			
Air Quality	Condition	HQ? @ Exposure Point	N/A		N	/A
(for informational		RISK? @ Exposure Point	N	/A	N N	//A
purpose only)	Target Air	@ HQ=1.0	N	/A	N	/A
purpose only)	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	I/A
	Target Soil	@ HQ=1.0	N	/A	N	I/A
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	I/A

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

**Evaluator:** 

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units .
1. General information			
Name of Chemical:	j	phenol	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	<b>7</b>		•
2. Toxicological Properties of the Chemical: Chemical-Specific			<b>-</b>
Oral Reference Dose:	$RfD_o$	6.00E-01	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	RfD <sub>i</sub>		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters	_		
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	2.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	11	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{\sigma c}$ value	K <sub>oc</sub>	2.900E+01	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	1.600E-05	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here: *Converted unitless form of $H_{cc}$ @13°C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	8.300E+04	mg/l
5. Target Ground Water Cleanup Level	'		
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:	_		1
*Results from the Ground Water Cleanup Level Worksheet are	$C_{1\nu}$	1.70E+06	ug/i
not automatically transferred into this worksheet.			]
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\boldsymbol{\varTheta}_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{a}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms	'		-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

phenol

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units			
Most stringent soil concentration based on Soil Direct					
Contact & Ground Water Protection:	9.324E+03	mg/kg			
Natural Background concentration for Soil:	N/A	mg/kg			
Practical Quantitation Limit for Soil:	N/A	mg/kg			
Soil Cleanup Level (not considering vapor pathway):	9.324E+03	mg/kg			
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	ıng/kg			

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	2.276E+04	mg/kg
Retardation Factor, R:	1.3	unitless

	Summary by Exposure Pathway						
	]		•	od <u>B</u> d Land Use RISK =1.0E-6	<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5		
Soil Direct			Ingestion only	Ingestion &	Ingestion only	Ingestion &	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil	@HQ=1.0	4.800E+04	N/A	2.100E+06	N/A	
	CUL? mg/kg	@RISK =1.0E-6 or 1.0E-5	N/A	N/A	N/A	N/A	
			<u>Meth</u> @ HQ=1.0; R	<u>10d B</u> ISK =1.0E-6	<u>Method C</u> DE-6 @ HQ=1.0; RISK =1.0E		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable	Condition	HQ? @ Exposure Point	N N	N/A		N/A	
Ground Water		RISK? @ Exposure Point	N/A		N/A		
	Target Ground Wat	er CUL? ug/l		1.700	E+06		
	Target Soil CUL?	mg/kg		9.324	E+03		
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	3 N/A				
Air Quality	Condition	HQ? @ Exposure Point	N	/A	N	/A	
(for informational		RISK? @ Exposure Point	N	/A	N	I/A	
purpose only)	Target Air	@ HQ=1.0	N	/A	N	//A	
	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	//A	1	I/A	
	Target Soil	@ HQ=1.0	N	I/A	N	I/A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	N	I/A .	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:		pyrene	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_{s}$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$ [		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	Ø		
2. Toxicological Properties of the Chemical: Chemical-Specific	_		<b>-</b>
Oral Reference Dose:	$RfD_o$	3.00E-02	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters			-
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	<i>INH</i>	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	6.800E+04	1/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	4.500E-04	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here: *Converted unitless form of $H_{cc}$ @13°C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	H H <sub>cc</sub>	0.000E+00	_atm.m³/mol _unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	1.400E-01	mg/l
5. Target Ground Water Cleanup Level	,		-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:  *Results from the Ground Water Cleanup Level Worksheet are not automatically transferred into this worksheet.	$C_{w}$	4.00E+03	ug/l
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{\scriptscriptstyle W}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{a}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			_
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			<del></del> 1
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

**Chemical of Concern:** 

pyrene

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		
Contact & Ground Water Protection:	1.394E+04	mg/kg
Natural Background concentration for Soil:	N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering vapor pathway):	1.394E+04	mg/kg
Warning! Soil Cleanup Level above may not be pr pathway - evaluate vapor pathwa	-	oor exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

Warning: Soil Cleanup Level is higher than Soil Saturation

Limit

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	2.440E+01	mg/kg	l
Retardation Factor, R:	608.3	unitless	

	Summary by Exposure Pathway						
			<u>Method B</u> Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	2.400E+03 N/A	N/A N/A	1.050E+05 N/A	N/A N/A	
				od B	Method C		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l		N/A			
Potable	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water		RISK? @ Exposure Point	N	/A	<u> </u>	/A	
	Target Ground Water Target Soil CUL?	4.000E+03 1.394E+04					
				<u>Method B</u> <u>Method o</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK			
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point		N/A			
Air Quality	Condition	HQ? @ Exposure Point	N/A		N/A		
(for informational	<u></u>	RISK? @ Exposure Point		N/A · N/A			
purpose only)	Target Air	@ HQ=1.0	<del> </del>	/A		//A	
	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	ļ	/A	<del> </del>	I/A	
	Target Soil	@ HQ=1.0	<del> </del>	/A _		//A	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	//A	l y	//A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	s	elenium	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		]mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for $AF$ , $ABS_d$ , $GI$ :	_ 		-
2. Toxicological Properties of the Chemical: Chemical-Specific			_
Oral Reference Dose:	$RfD_o$	5.00E-03	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>o</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	CPF <sub>i</sub>		kg-day/mg
3. Exposure Parameters	_		_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	<i>INH</i>	1.00E+00	unitless
Inhalation Absorption Fraction (default = "I"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	5.000E+00	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	<i>H</i> <sub>cc.</sub> <b>♦</b>	0.000E+00	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here:  *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H\atop H_{cc}$	0.000E+00	atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S		_lmg/l
5. Target Ground Water Cleanup Level			-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:  *Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	7.10E+01	ug/l
not automatically transferred into this worksheet.			
6. Site-Specific Hydrogeological Characteristics	·		_
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{v}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	1	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)	,		7
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF	•	unitless

Chemical of Concern:

selenium

### 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units
Most stringent soil concentration based on Soil Direct		
Contact & Ground Water Protection:	7.384E+00	mg/kg
Natural Background concentration for Soil:	N/A	mg/kg
Practical Quantitation Limit for Soil:	N/A	mg/kg
Soil Cleanup Level (not considering vapor pathway):	7.384E+00	mg/kg
Warning! Soil Cleanup Level above may not be pr pathway - evaluate vapor pathwa	-	or exposure
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg

Warning: Soil Cleanup Level is higher than Soil Saturation

Limit

V

**C**<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	0.000E+00	mg/kg
Retardation Factor, R:	18.4	unitless

	Summary by Exposure Pathway						
		· • • • • • • • • • • • • • • • • • • •	Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		Method C Industrial Land Use @ HQ=1.0; RISK =1.0E-5		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	4.000E+02 N/A	N/A N/A	1.750E+04 N/A	N/A N/A	
			<u>Metla</u> @ HQ=1.0; RU	od B		od C	
Protection of	Under the Current	Predicted Ground Water Conc? ug/l		N	/A		
<b>Potable</b>	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water		RISK? @ Exposure Point	N/A		N/A		
		rget Ground Water CUL? ug/l 7.100E+01 rget Soil CUL? mg/kg 7.384E+00				····	
	Traiget 3011 COL!	mg/kg	Method B         Method of Method				
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point		N/A			
Air Quality	Condition	HQ? @ Exposure Point	N	/A	N/A		
(for informational purpose only)		RISK? @ Exposure Point	N	//A	-	I/A	
	Target Air	@ HQ=1.0	N	/A	<del> </del>	N/A	
	CUL? ug/m <sup>3</sup>	@ RISK=1.0E-6 or 1.0E-5	<del> </del>	/A	-	I/A	
	Target Soil	@ HQ=1.0		I/A	<del>                                     </del>	VA	
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	I/A	<u> </u>	I/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- · Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	S	ilver	
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_s$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for AF, ABS d, GI:	<b></b>		_
2. Toxicological Properties of the Chemical: Chemical-Specific			_
Oral Reference Dose:	RfD <sub>o</sub>	5.00E-03	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF o		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_i$		kg-day/mg
3. Exposure Parameters	_		_
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	1.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF [	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific	_		
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K oc	8.300E+00	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	H <sub>cc</sub> ♠	0.000E+00	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m <sup>3</sup> /mol", enter value here: *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	atm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S		mg/l
5. Target Ground Water Cleanup Level		-	<del>-</del>
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:			]
*Results from the Ground Water Cleanup Level Worksheet are	$C_{w}$	1.90E+00	ug/İ
not automatically transferred into this worksheet.			_
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	n	0.43	unitless
Volumetric Water Content (default = "0.30"):	$oldsymbol{arTheta}_{\scriptscriptstyle NP}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{\alpha}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	1	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			•
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the			
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

silver

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

	Basis for Soil Concentration	Conc	Units	
	Most stringent soil concentration based on Soil Direct			y
	Contact & Ground Water Protection:	3.230E-01	mg/kg	L
	Natural Background concentration for Soil:	N/A	mg/kg	
	Practical Quantitation Limit for Soil:	N/A	mg/kg	
	Soil Cleanup Level (not considering vapor pathway):	3.230E-01	mg/kg	
•	Warning! Soil Cleanup Level above may not be propathway - evaluate vapor pathway	-	or exposure	
•	Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg	

Warning: Soil Cleanup Level is higher than Soil Saturation

Limit!

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, C <sub>sat</sub> :	0.000E+00	mg/kg
Retardation Factor, R:	30.0	unitless

Summary by Exposure Pathway								
			Method B Unrestricted Land Use @ HQ=1.0; RISK=1.0E-6		<u>Method C</u> Industrial Land Use @ HQ=1.0; RISK =1.0E-5			
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion &		
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A		
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	4.000E+02 N/A	N/A N/A	1.750E+04 N/A	N/A N/A		
		- Gradie 1102 d d 1102 d	<u>Meth</u> @ HQ=1.0; R	od B	d B Method C			
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A					
Potable	Condition	HQ? @ Exposure Point		N/A		N/A		
Ground Water		RISK? @ Exposure Point	N	/A 1.900	N/A			
	Target Ground Water Target Soil CUL?			3.230				
			<u>Method B</u> <u>Method C</u> @ HQ=1.0; RISK =1.0E-6 @ HQ=1.0; RISK =1.0E-5					
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point						
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			N/A		/A
(for informational		RISK? @ Exposure Point	N/A		N/A			
purpose only)	Target Air	@ HQ=1.0	N/A		N	/A		
	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A		
	Target Soil	@ HQ=1.0	N	/A	N/A			
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A		

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(i) and 173-340-745(5)(b)(i));
- · Soil residual saturation (see WAC 173-340-747(10));
- Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- · Total site risk (see WAC 173-340-750(5)(a)).

Date:

12/7/2006

Site Name:

Former Rhone-Poulenc Site Northwest Corner

Evaluator:

Z. Satterwhite

Refer to WAC 173-340-720, 740, 745, 747 and 750 for details.

#### A. INPUT PARAMETERS FOR SOIL CLEANUP LEVEL CALCULATIONS

Item	Symbol	Value	Units
1. General information			
Name of Chemical:	[2	2,4,5-trichlor	ophenol
Measured Soil Concentration, if any:	$C_s$		mg/kg
Natural Background Concentration for Soil:	$NB_{s}$		mg/kg
Practical Quantitation Limit for Soil:	$PQL_s$		mg/kg
To evaluate the ingestion and dermal pathways concurrently, check here and input values for $AF$ , $ABS_d$ , $GI$ :	V		
2. Toxicological Properties of the Chemical: Chemical-Specific	_		-
Oral Reference Dose:	$RfD_{\sigma}$	1.00E-01	mg/kg-day
Oral Carcinogenic Potency Factor:	CPF <sub>0</sub>		kg-day/mg
Inhalation Reference Dose:	$RfD_i$		mg/kg-day
Inhalation Carcinogenic Potency Factor:	$CPF_{i}$		kg-day/mg
3. Exposure Parameters			~
Inhalation Correction Factor (default = "2" for volatiles; "1" for all others): for target ground water cleanup level	INH	2.00E+00	unitless
Inhalation Absorption Fraction (default = "1"): for target air cleanup level	$ABS_i$	1	unitless
Gastrointestinal Absorption Fraction (default = "1"): for ingestion & dermal exposure pathways	AB1	1	unitless
Adherence Factor (default = "0.2"): for dermal exposure pathway	AF	0.2	mg/cm²-day
Dermal Absorption Fraction (chemical-specific or defaults): for dermal exposure pathway	$ABS_d$		unitless
Gastrointestinal Absorption Conversion Factor (chemical-specific or defaults): for dermal exposure pathway	GI [		unitless
4. Physical and Chemical Properties of the Chemical: Chemical-Specific			_
Soil Organic Carbon-Water Partitioning Coefficient: for metals, enter $K_d$ value here and enter "1" for $f_{oc}$ value	K <sub>oc</sub>	1.600E+03	l/kg
Henry's Law Constant: for the evaluation of ground water and vapor exposure pathway	$H_{cc}$	1.800E-04	unitless
*If the value for Henry's Law Constant is given in the unit of "atm.m $^3$ /mol", enter value here:  *Converted unitless form of $H_{cc}$ @13° C: (Enter this converted value into " $H_{cc}$ input Box" above for a calculation)	$H_{cc}$	0.000E+00	latm.m³/mol unitless

Solubility of the Chemical in Water: for the calculation of soil saturation limit	S	1.200E+03	mg/l
5. Target Ground Water Cleanup Level			-
Target Ground Water Cleanup Level applicable for a soil cleanup level calculation:		·	]
*Results from the Ground Water Cleanup Level Worksheet are	$C_w$	3.60E+03	ug/l
not automatically transferred into this worksheet.			
6. Site-Specific Hydrogeological Characteristics			
Total Soil Porosity (default = "0.43"):	11	0.43	unitless
Volumetric Water Content (default = "0.30"):	$\Theta_{w}$	0.3	unitless
Volumetric Air Content (default = "0.13"):	$\Theta_{a}$	0.13	unitless
Dry Soil Bulk Density (default = "1.50"):	$\rho_b$	1.5	kg/l
Fraction Soil Organic Carbon (default = "0.001"): for metals, enter "1" for $f_{oc}$ value here	$f_{oc}$	0.00256	unitless
Dilution Factor (default = "20" for unsaturated zone soil; "1" for saturated zone soil; or site-specific)	DF	20	unitless
7. Vapor Attenuation Factor due to Advection (building structure) & Diffusion (soil layer) Mechanisms			-
* Vapor Attenuation Factor is the ratio of vapor-phase contaminant concentration within the soil at the source to the	,		
air concentration at the exposure point (e.g., within the building)			_
Enter Vapor Attenuation Factor: for the evaluation of vapor exposure pathway	VAF		unitless

Chemical of Concern:

2,4,5-trichlorophenol

## 1. Summary of Results

To calculate a soil cleanup level based on Industrial Land Use (Method C) for Direct Soil Contact, check here:

To calculate a soil concentration based on Method C vapor pathway, check here:

Basis for Soil Concentration	Conc	Units			
Most stringent soil concentration based on Soil Direct					
Contact & Ground Water Protection:	3.093E+02	mg/kg			
Natural Background concentration for Soil:	N/A	mg/kg			
Practical Quantitation Limit for Soil:	Quantitation Limit for Soil: N/A				
Soil Cleanup Level (not considering vapor pathway):	3.093E+02	mg/kg			
Warning! Soil Cleanup Level above may not be protective of vapor exposure pathway - evaluate vapor pathway further.					
Soil concentration based on Vapor Pathway (informational purposes only):	0.000E+00	mg/kg			

C<sub>sat</sub> corresponds to the total soil chemical concentration saturated in soil.

Soil Saturation Limit, $C_{sat}$ :	5.155E+03	mg/kg
Retardation Factor, R:	15.3	unitless

Summary by Exposure Pathway							
			Method B Unrestricted Land Use @ HQ=1.0; RISK =1.0E-6		Method C Industrial Land Use @ HQ=1.0; RISK =1.0E-5		
Soil Direct			Ingestion only	Ingestion & Dermal	Ingestion only	Ingestion & Dermal	
Contact	Under the Current Condition	HQ? @ Exposure Point RISK? @ Exposure Point	N/A N/A	N/A N/A	N/A N/A	N/A N/A	
	Target Soil CUL? mg/kg	@HQ=1.0 @RISK =1.0E-6 or 1.0E-5	8.000E+03 N/A	N/A N/A	3.500E+05 N/A	N/A N/A	
			<u>Meth</u> @ HQ=1.0; Rl		Method C		
Protection of	Under the Current	Predicted Ground Water Conc? ug/l	N/A				
Potable	Condition	HQ? @ Exposure Point	N/A		N/A		
Ground Water		RISK? @ Exposure Point	N	N/A		N/A	
·	Target Ground Wate	<del></del>		3.600	<del></del>		
	Target Soil CUL?	mgkg		3.093E+02 <u>Method B</u> <u>Metho</u> Q=1.0; RISK =1.0E-6 @ HQ=1.0; RIS			
Protection of	Under the Current	Predicted Air Conc? ug/m³ @Exposure Point	N/A				
Air Quality	Condition	HQ? @ Exposure Point	N/A N/A			/A	
(for informational		RISK? @ Exposure Point	N/A		N/A		
purpose only)	Target Air	@ HQ=1.0	<del> </del>	/A	ļ	//A	
	CUL? ug/m³	@ RISK=1.0E-6 or 1.0E-5	N	/A	<del> </del>	/A	
	Target Soil	@ HQ=1.0	<del> </del>	N/A 1			
	CUL? mg/kg	@ RISK=1.0E-6 or 1.0E-5	N	/A	N	/A	

CAUTION: The requirements and procedures for establishing soil cleanup levels that are protective of human health and the environment are specified in the MTCA Cleanup Regulation (see WAC 173-340-740, 173-340-745, 173-340-747 and 173-340-7490 through 173-340-7494). The use of this Workbook is not sufficient to establish soil cleanup levels under the regulation. Specifically, the soil cleanup levels derived using this Workbook do not account for the following:

- · Concentrations based on applicable state and federal laws (see WAC 173-340-740(3)(b)(l) and 173-340-745(5)(b)(l));
- · Soil residual saturation (see WAC 173-340-747(10));
- · Ecological impacts (see WAC 173-340-7490 through 7494); and
- Total site risk (see WAC 173-340-740(5)(a) and 173-340-745(6)(a)).

Other exposure pathways may also need to be evaluated on a site-specific basis to establish soil cleanup levels.

- · Concentrations based on applicable state and federal laws (see WAC 173-340-750(3)(b)(i) and (4)(b)(i));
- · Concentrations based on natural background and the practical quantitation limit (see WAC 173-340-750(5)(c));
- Total site risk (see WAC 173-340-750(5)(a)).